

REMARKS

The present invention is directed to packaging laminates, containers and blanks containing gas barrier layers of a carbon-containing silicon oxide. The materials of the present invention are particularly suitable in the manufacture of packaging products for food. The materials have excellent oxygen gas and aroma barrier properties while affording excellent flexibility and moldability such that they can be processed using conventional packaging machines. Further, the constituents of the materials of the present invention are ecologically benign, and the resulting packaging products can be readily recycled.

Among other things, the materials of the present invention possess the surprising and unexpected advantage of the oxygen gas and aroma barrier properties of aluminum foil in a thin layer of carbon-containing silicon oxide. The resulting products are highly economical and recyclable, and avoid structural defects such as tears often associated with the use of other materials in packaging products for food.

Recent developments in chemical vapor deposition technology have facilitated advancements in the use of films, including films of silicon oxide, as oxygen gas barrier materials. Those materials and methods have produced laminate materials that are generally deficient as gas barrier layers due to, e.g., susceptibility to cracking and/or delamination. See, e.g., Specification at pp. 1-2. This renders those materials unsuitable for use in packaging materials for food products that require protection from oxygen.

Other references that describe layers of silicon oxide as gas barrier layers include the Kunz and Namiki references, relied upon in the parent application. Those references fail to teach or suggest the presently claimed invention.

Kunz (USPN 5,387,449) discusses the use of traditional silicon oxide layers as gas barriers. The gas barrier layers of the Kunz reference are inorganic (not carbon-containing) silicon oxide layers. Those materials suffer the shortcomings of conventional inorganic silicon oxide layers, i.e., they are brittle and susceptible to cracking, and the resulting films are not sufficiently flexible for use in packaging laminates. Kunz, however, fails to identify those problems.

More specifically, Kunz describes combining one or more discrete layers of ceramic between separate and distinct layers of one or more polymeric materials. Kunz, col. 1, line 62-col. 2, line 4, and col. 2, lines 8-59. The polymeric materials are either polyester or polyolefin. Id. In each of the various embodiments, the ceramic must be placed between the polymeric layers. Id. The ceramic layer can be deposited by a chemical coating process (CVD), and can be silicon oxide. Col. 4, lines 26-39. The ceramic layer functions as a barrier layer. Col. 4, lines 60-61. The thickness and number of ceramic layers can vary. Col 5, lines 4-7. The laminates can be structured such that a ceramic layer faces a ceramic layer (col. 5, lines 14-18); and Kunz describes various bonding agents to be used between the various plastic and/or ceramic layers (col. 5, line 46 - col. 6, line 23).

Kunz is silent as to potential advantages that might arise with the addition of an organic component to its silicon oxide barrier layers. And Kunz fails to teach or

suggest embodiments wherein the ceramic layer is exposed to the exterior of either side of the laminate.

As with Kunz, Namiki (USPN 5,641,559) teaches the use of a silicon oxide layer in laminates used for packaging foods. The silicon oxide can be applied via CVD. Col. 3, lines 8-17. Unlike Kunz, however, Namiki describes laminated plastic films that include a polymeric (organic) silicon oxide layer. The Namiki reference teaches that laminates such as are disclosed in Kunz do not have sufficient gas tightness. Col. 3, lines 1-3. Namiki teaches that it is possible to overcome that shortcoming by applying two silicon oxide layers: one being an organic silicon oxide layer, and the other being an inorganic silicon oxide layer. Col. 3, lines 20-29.

Namiki teaches that, as with the inorganic silicon oxide layer, the organic silicon oxide layer used alone does not impart gas tightness. *Id.* Namiki teaches that the two layers (inorganic and organic silicon oxide) must be used in combination, and must be immediately adjacent each other. Col. 3, lines 30-39. Thus, according to Namiki, laminates comprised of layers of only inorganic silicon oxide have insufficient gas tightness; and layers of only organic silicon oxide do not have gas tightness.

The presently claimed invention is a laminate wherein a substrate layer is coated with an organic silicon oxide layer devoid of an immediately adjacent inorganic silicon oxide layer. As such, the claimed invention goes squarely against the plain teaching of Namiki. The organic silicon oxide-coated substrate is combined with another laminate through an intermediate bonding layer. In one embodiment, an organic silicon oxide layer is an external layer of the ultimate laminate, and the

other silicon oxide layer is an interior layer between the polymeric substrate and an adhesive. Such a laminate is described within the instant specification, e.g., at p. 9, line 27 – p. 10, line 10.

More specifically, the claimed invention is a laminate consisting of two prefabricated laminates. One of those prefabricated laminates consists of a substrate layer coated on both sides with only an organic silicon oxide layer. One side of the prefabricated laminate is bonded to another prefabricated laminate through an intermediate layer of adhesive. The second prefabricated laminate can be any of a number of various structures wherein there is a core layer coated on both sides with a layer of a heat-sealable thermoplastic polymer. Notwithstanding the teachings of Namiki, the laminates of the claimed invention possess the desired level of gas tightness.

The claimed invention is neither taught nor suggested by Kunz and Namiki, alone or in combination. Kunz fails to mention the use of an organic silicon oxide layer in a laminate of the type claimed. Namiki teaches that laminates of the type described by Kunz have insufficient gas tightness. Namiki purportedly overcomes that shortcoming by adding a layer of organic silicon oxide. Namiki plainly teaches that the shortcoming is overcome only by adding – not substituting – an organic silicon oxide layer. Applicants, on the other hand, have surprisingly shown that, with the appropriate selection of materials and parameters, as described in the instant specification, a laminate with the requisite gas tightness can be fabricated using only organic silicon oxide layers as the aroma/gas barrier layers.

In view of the foregoing, applicants submit that the claims of the instant application are in condition for allowance. Applicants request formal notification to that effect. If, however, the examiner perceives any impediments to such notification, whether it be substantive or formal, applicants ask that the examiner call their representative at the number provided below. Such informal communication will expedite examination and disposal of the instant case.

Respectfully submitted,
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